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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/817,140 | 04/02/2004 | Ki-Ho Baik | AM-8893 | 1497 |

7590 01/24/2007
Patent Counsel
APPLIED MATERIALS, INC.
Legal Affairs Department
P.O. Box 450A
Santa Clara, CA 95052

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| EXAMINER |
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RAYMOND, BRITTANY L

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| ART UNIT | PAPER NUMBER |
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1756

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
|--|------------|---------------|
| 3 MONTHS | 01/24/2007 | PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

| | | | |
|------------------------------|------------------|--------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/817,140 | BAIK ET AL. | |
| | Examiner | Art Unit | |
| | Brittany Raymond | 1756 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 4/2/2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner:
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>6/23/2004</u> | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 4, 5 and 9-17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 4 and 5 are indefinite because the phrase, "said radiation" refers to the preamble of claim 1, which is not the Jepson part of the claim.

Claims 9 and 15 recite the limitation "said imaged photoresist" in line 5. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

4. Claims 1-3 and 8 are rejected under 35 U.S.C. 102(e) as being anticipated by Kirkpatrick (U.S. Patent Application 2006/0084229).

Kirkpatrick discloses a method for fabricating a semiconductor device comprising: depositing and patterning a photoresist layer over a substrate (Paragraph 0038) and subjecting the developed substrate (See Figures 3A-3F) to a vacuum ranging

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from $1e^{-3}$ Torr to $1e^{-8}$ Torr (Paragraph 0039), which is equal to 1 mTorr to $1e^{-5}$ mTorr and is within the range recited in claim 1 of the present invention. Kirkpatrick also discloses that the time the substrate is held in the vacuum ranges from 2 minutes to 60 minutes and the temperature of the vacuum may range from 20 degrees Celsius to five degrees less than the glass transition temperature of the photoresist used (Paragraph 0039), which are within the ranges recited in claims 2 and 3 of present invention. Subjecting the developed substrate to a vacuum under these conditions also meets the limitations of claim 8 of the present invention.

Kirkpatrick teaches every limitation of claims 1-3 and 8 and thus anticipates the claims.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 4-7 and 9-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kirkpatrick (U.S. Patent Application 2006/0084229) in view of Itoh (U.S. Patent Application 2004/0058279).

The teachings of Kirkpatrick have been discussed in paragraph 4 above.

Kirkpatrick fails to disclose a process, as recited in the claims, which the vacuum exposure is used in, and the type of radiation used during imaging.

Itoh discloses a pattern formation method comprising: providing a substrate coated with a chromium film and a resist on top (Paragraph 0057), baking the substrate for ten minutes (Paragraph 0058), writing on the resist film with an electron beam writing apparatus (Paragraph 0058), post exposure baking the substrate for fifteen minutes and developing the resist film (Paragraph 0060), as recited in claims 9 and 15 of the present invention. Itoh discloses that the substrate is left to stand in a vacuum after the writing step (Paragraph 0065), which is before the post exposure baking and developing steps, as recited in claims 6, 7, and 9 of the present invention. Itoh also discloses that along with the electron beam radiation, used in the process above, ultraviolet radiation, which is a type of optical radiation, can be used to pattern a resist, as recited in claims 4, 5, 12, 13, 16, and 17 of the present invention. The limitations of claims 10, 11, and 14 have been described by Kirkpatrick in paragraph 4 above.

It would have been obvious to one of ordinary skill in the art, at the time of invention by applicant, to have used the vacuum exposure step of Kirkpatrick in the process, as suggested by Itoh, because Itoh teaches that using this process in a specific order allows for the formation of a resist pattern with desired dimensions. It

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would have also been obvious to have used electron beam or optical radiation, as suggested by Itoh, because Itoh teaches that these are commonly used in patterning resists and they also help to efficiently produce a desired pattern size.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brittany Raymond whose telephone number is 571-272-6545. The examiner can normally be reached on Monday through Friday, 8:00 a.m. - 4:30 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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KATHLEEN DUDA
PRIMARY EXAMINER